

ABSTRACT OF THE DISCLOSURE

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Exposure of colorectal cancer (CRC) cells to ionizing radiation results in a growth arrest, with cells blocked in both the G1 and G2 phases of the cell cycle. The G1 block has been shown to be due to the p53-mediated induction of the cyclin-dependent kinase inhibitor p21^{WAF1/CIP1/SDII}, but the basis for the G2 arrest is unknown. Through a quantitative analysis of gene expression patterns in CRC cell lines, we have discovered that $14-3-3\sigma$ is strongly induced by γ -irradiation and other DNA-damaging agents. The induction of $14-3-3\sigma$ is mediated by a p53-responsive element located 1.815 kb upstream of its transcription start site. Exogenous introduction of $14-3-3\sigma$ into cycling cells results in a G2 block similar to that observed following irradiation. These results document a molecular mechanism for G2/M control that is regulated in human cells by p53.